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(56) Documents Cited
GB 2275123 A EP 0271624 A1 US 3526773 A

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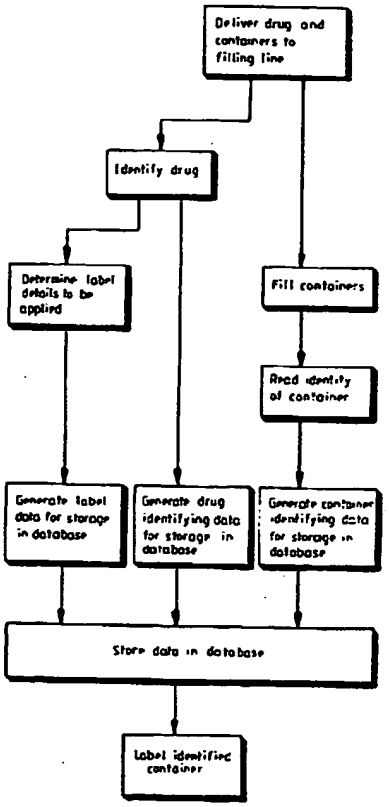
(54) Abstract Title
**Drug packaging method**

(57) A drug packaging method is particularly useful in the preparation of containers for use in clinical trials. Containers are produced each of which carries a unique remote-readable identifier in the form of for example an RFID tag. The containers are filled with a selected drug to be packaged and the identity of each filled container is determined from the remote-readable identifier. The identity of the container and of the drug are stored in a database with associated labelling data and the label is applied to the container, the label reproducing the labelling data associated in the database with the identified container.

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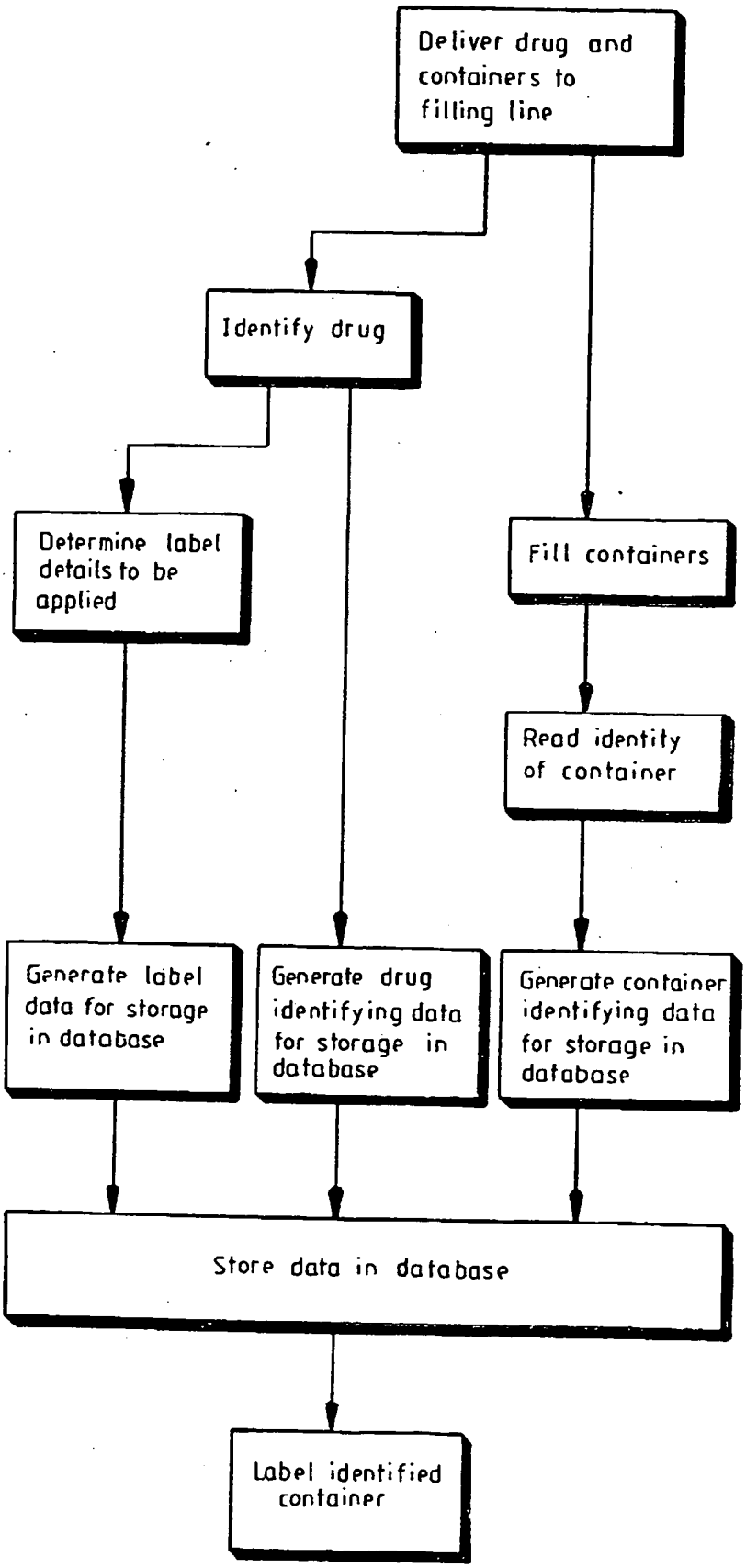
Deliver drug and containers to filling line
Identify drug
Determine label details to be applied
Fill containers
Read identity of container
Generate label data for storage in database
Generate drug identifying data for storage in database
Generate container identifying data for storage in database
Store data in database
Label identified container

# DRUG PACKAGING METHOD

The present invention relates to a drug packaging method and in particular to such a method which has particular utility in the packaging of drugs used for clinical trials.

When new drugs are developed, it is necessary for the manufacturers to conduct extensive, time consuming and costly trials. Clinical trials generally occur in phases, that is by testing the drugs firstly on animals, then on terminally ill patients, then on healthy volunteers and so on. The trials can be conducted in different parts of the world where different languages are used, and the drugs can be delivered in various formats, for example simple bottles, or blister packs in which each of a series of tablets is delivered to the user in a separate section of a flexible carrier from which tablets are removed by rupturing individual tablet compartments. In clinical trials, it is generally the case that the drug under test is administered to a first group of patients, a placebo is administered to a second group, and the "best" equivalent to the drug under test is administered to a third group. It is of course crucial to identify which containers carry the drug under test, which containers carry the placebo, and which containers carry the currently available equivalent drug. It is essential that the information which can be read from the containers by a user does not indicate to which of these three categories the tablets carried by the container belongs. Neither the person taking the tablets nor the individuals responsible for packaging the tablets must know what each tablet contains. Labels applied to the tablets must carry instructions to the user, for example take one tablet on each of 28 consecutive days, and a record must be kept of the content of the container from which a particular user takes tablets. All relevant information must be returned to the company conducting the clinical trials so that the efficacy of the drug under test can be compared with the placebo and the equivalent drug. This requires a major effort in terms of establishing databases to ensure that data generated as the result of the trial is correctly correlated with the identity of the particular tablets taken by a particular patient to whom those tablets are administered.

Clinical trials are a necessary precursor to commercial exploitation of new drugs and must not only satisfy the drug developer's research needs but also statutory

requirements. Clinical trials by their very nature are of complex configuration predetermined by protocols established outside of the clinical trial departments of the pharmaceutical companies. These protocols will be issued as a Trial Instruction and will identify the drugs, pack information and style, the bottle or pack fill information , labels required, number of patients recruited, and the countries in which the trial is to be conducted, leading to the quantification of bottles or packs, outer cartons and label requirements. Packs are usually filled and then returned after line clearance to a warehousing facility to be brought back in for labelling and then for pack assembly. Labels are printed in a separate environment and then brought together with the container for labelling and secondary packaging, then on to a despatch area. The traceability of drug batch number, the patient number, the label etc is a major problem that is continually addressed by various control systems. Studies are conducted "blind" and this aspect of a trial can be undermined by any use of visible coding or non functional packaging variations. The correctness of the packaging requirement is threatened by errors at labelling, assembly and distribution stages and as a result a great amount of resource is applied to quality control and assurance. This is time consuming and consequently can be expensive. A study may be made up of several different products, each product packed separately, with product doses arranged in a specific format in a patient pack. The patient packs may then be shipped using further outer labels to various sites through the world. As a result, the logistics of a trial are considerable, bearing in mind the number of patients who are randomised in patient numbers, the product variations, the label variations for different countries, the control of despatch etc.

By the standards of the pharmaceutical industry, clinical trials involve relatively small volumes of tablets and therefore the filling and labelling of containers used in clinical trials has been largely a manual operation. A container filling line is cleared of all drugs, a batch of tablets identified by the supplier as for example "tablet A" is delivered to the packaging line with a batch of labels appropriate to that particular tablet. Containers are then filled and the associated labels are applied to the containers. Once a first batch of tablets has been processed, the packaging line is cleared and a second batch is delivered to the line, for example "tablet B", with associated labels and the next batch of containers is filled and labelled. Typically

each label will incorporate a code number which identifies the particular batch of tablets which has been used to fill a particular batch of containers. Meticulous care must be taken to ensure that no mistakes are made either with regard to filling containers or applying labels to the appropriate containers.

After a patient has taken a particular batch of tablets, data must be gathered as to the associated circumstance, for example to confirm that the patient does at least say that the tablets have been taken in accordance with the instructions set out on the label, the identity of the patient and the identity of the drug which has been taken. The drug identity may be determined by reading information off the label, and therefore if there is any mis-matching as between labels and containers this can invalidate and render a costly and time consuming trial worthless.

It is an object of the present invention to provide a drug packaging method which can simplify the process of accurately identifying the content of a particular drug container.

According to the present invention, there is provided a method for packaging a drug in which drug containers are produced each of which carries a unique remote-readable identifier, and the containers are filled with a selected drug to be packaged, wherein the identity of each container is determined, the identity of each container and the identity of the drug with which it is filled is stored in a database with associated labelling data, and a label is applied to the container, the label reproducing the labelling data being associated in the database with the identified container and the drug with which that container is filled.

As each container can be uniquely identified, and its content and the associated labelling data is determined at the time that the container is filled, a database can be established which directly associates the content of a container with the label which is applied to that container, the method being immune to errors assuming that the basic information identifying a particular batch of drugs which has been delivered for packaging and the associated label data has been correctly entered. There is no risk of mis-labelling as labels are generated at the point of packaging directly from the database by reference to the drug identifying data.

Each container may incorporate a radio frequency identification tag storing a unique identification code. For example individual tags can be incorporated into the

base of a tablet bottle or into a surface of a tablet blister pack. A radio frequency identification tag (RFID tag) can be fabricated in a relatively small rigid structure or incorporated into a flexible structure suitable for application to a blister pack.

Containers can be produced each of which incorporates a remote-readable identifier pre-programmed with a unique identification code, the identification code of each container being read at the time of packaging either before or after that container is filled with tablets. Alternatively, containers may be produced incorporating remote-readable identifiers which are programmable with a unique identification code at the time of packaging, the containers being programmed before or after they are filled and the remote identification code being read after the identifier has been programmed.

The containers themselves may be used in the data collection process which follows the administration of particular tablets to particular users. For example the container may be returned to a central point with a simple questionnaire indicating for example that all of the tablets have been taken in the manner instructed by the label. The full identity of the tablets which had been contained within that container can then be determined simply by reading the remote-readable identifier.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawing.

Referring to the drawing, this is a simple flow diagram seeking to illustrate one embodiment of the invention. A drug in the form of a batch of tablets to be packaged is delivered to the packaging line which has been previously cleared of all other tablets. The packaging line is also supplied with containers each of which carries an RFID tag, but at this stage in the process the containers are in no way associated with any particular batch of tablets. The identity of the batch of drugs is entered into a computer system, converted into data identifying the particular drug, for example "drug batch A" and that data is stored in a database. Details of a label appropriate to that batch are also entered or looked up from a look-up table previously entered into the computer system so as to determine the appropriate label details. Label data representative of the determined label details is then generated and stored in the database. Containers are then filled with the tablets, the RFID tag of each filled container is read, and container identifying data is generated and stored in the

database. The database then produces an appropriate label which is applied to the identified container. A label may be produced in the form of an adhesive strip but preferably is directly printed onto the container itself so that no manual intervention associating a particular label with a particular container is required.

Alternative methods which differ from that described above are of course possible. For example, rather than simply relying upon the remote readable tag to identify the container, the remote readable tag may also be written to so as to store within it for example the identity of the tablets with which the container has been filled, or any other production process or tablet identity details deemed appropriate by the organisation running the intended clinical trials.

The containers themselves may be used to assist in the generation of data of relevance to the overall clinical trial programme. For example, the containers may be issued to users with instructions that the containers be returned to a central collection point after the tablets have all been administered to a patient. The data stored on the tag incorporated in any one container can then be read to provide confirmation that the tablets sent out in that particular container have been administered to the patient to whom the container was sent. Thus the present invention is relevant not only to addressing the issue of ensuring the appropriate identification and labelling of containers for use in clinical trials but may also assist in the collection of data with regard to the progress of the clinical trials.

The particular embodiment of the invention described above makes use of an RFID tag but it will be appreciated that other remote-readable identifiers could be used, the only fundamental requirement of the remote-readable identifier being that it carries data which is unintelligible to any one without an appropriate reader and that the data can be read without physical interaction with the container in which the tag or other identifier is incorporated.

In summary, the use of RFID tags or functional equivalents makes it possible to address the challenges presented in clinical trial packaging. Each tag may be uniquely identified at manufacture and can be applied at the very earliest stages of packaging of a product e.g. to a bottle, a blister tray or a blister wallet, an ampoule or syringe etc. The opportunity to write to or read from a tag or its associated database, provides many opportunities in the areas of control and formal workflow at all stages

and makes it possible readily to record details and status of materials, assembly and storage, to interrogate and update the database or tag as required for planning and scheduling, material transfer from a warehouse, filling and labelling and package assembly. With the use of hand held readers essential data can be read off-site by clinicians, monitors or quality assurance staff. Probably of most importance is that the combination of the unique tag identification allied to a database enables specific "instructions" to be issued. For instance, at the appropriate point in the process a label can be printed, verified and applied in the secure knowledge that it is correct; the correct contents of a patient pack can be verified, not only for content but also for position in a sealed pack without the need to open the pack and check visibly. Again, despatch labels can be printed by accessing the database and verifying the data stored. Just in time packaging is a very real possibility, especially with the opportunity to re-write (a change of address/label/patient etc) the tags in a controlled manner. The basis of a clinical trial packaging unit is to put the right drug in to the correct container, apply the correct label to the container and to pack these in the correct formation in a patient pack which must also be labelled correctly and despatched to the correct address. All of these areas can be controlled and verified with the use of RFID tags.

## CLAIMS

1. A method for packaging a drug in which drug containers are produced each of which carries a unique remote-readable identifier, and the containers are filled with a selected drug to be packaged, wherein the identity of each container is determined, the identity of each container and the identity of the drug with which it is filled is stored in a database with associated labelling data, and a label is applied to the container, the label reproducing the labelling data associated in the database with the identified container.

2. A method according to claim 1, wherein each container incorporates a radio frequency identification tag storing at least a unique identification code.

3. A method according to claim 1 or 2, wherein containers are produced incorporating remote-readable identifiers pre-programmed with a unique identification code, and the unique identification code is read before or after the container is filled.

4. A method according to claim 1 or 2, wherein containers are produced incorporating remote-readable identifiers which are programmable with at least a unique identification code, the containers being programmed before or after they are filled, and the identification code being read after the identifier has been programmed.

5. A method for packaging a drug substantially as hereinbefore described with reference to the accompanying drawing.

The Patent Office

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**Claims searched:** 1-5

**Examiner:** Mike Davis
**Date of search:** 15 December 1999

## Patents Act 1977
## Search Report under Section 17

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G4H (HJ)

Int Cl (Ed.6): G06K, G01V

Other: Online: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage | | Relevant to claims |
|---|---|---|---|
| A | GB 2275123 A | (HOSSACK ET AL) eg abstract | - |
| A | EP 0271624 A1 | (TOURETTE) eg abstract | - |
| A | US 3526773 | (DAVIS) eg abstract | - |

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| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
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